# In this issue

### Origin of the Ganga

*Myths and reality*

The Bhagirathi River originating from the snout of the Gangotri Glacier meets the Alaknanda, a river emanating from the Sathopanth Glacier at Devprayag to form the Ganga. But there is also a belief that the Ganga originates from the Manasarovar Lake in Tibet. Which claim is right?

Researchers from the Banaras Hindu University, the National Institute of Hydrology, Roorkee, and the Symbiosis International (Deemed) University, Pune came together to resolve the issue. They took digital elevation models of the area from the Shuttle Radar Topographic mission to examine whether water from the Manasarovar Lake can flow to form the Ganga. And they found that the lake and the river are in two distinct watersheds, separated by mountain ranges that preclude the possibility of a connection at surface levels.

But then, the connection could be there through underground channels. To check this possibility, they looked into the isotope signatures of oxygen and hydrogen as well as at dissolved salts in the waters. If the origin of the Ganga were from the Manasarovar, the isotope signatures should match. But they found that the isotope and solute concentrations of the Ganga were closer to those of the melt water of the Gangotri and the Sathopanth Glaciers than to those in the water from the Manasarovar Lake.

Read the General Article on **page 1062** in this issue for more.

### Hydrogel Saves Water

*Improves wheat production*

The experimental use of hydrogels in agriculture has been increasing in the recent years. Hydrogels can absorb large amounts of water and release it slowly over time. The research results so far have shown that hydrogels can be useful in rain-fed and dry land agriculture.

Researchers from the ICAR-Indian Institute of Soil and Water Conservation, Dehradun talked to the farmers in Badasi Gaon in the Raipur Block of the Dehradun district, and partnered with them to test the use of the Pusa hydrogel in their fields. Five kilograms of Pusa hydrogel per hectare was applied during the Rabi season of 2017 by mixing it with dry soil in a ratio of 1 : 10 and uniformly distributed in their fields. They grew wheat variety HS-507, suited for the North West Himalayan region.

The researchers measured the wheat yield and productivity of one square metre from ten different plots where the hydrogel was applied as well as from fields where the hydrogel was not applied. The plant population per square metre increased from 163 to 210 where the hydrogel was applied and wheat yield increased 1.64 fold due to the application of the hydrogel. Thus hydrogel application can help increase wheat yield under rain-fed conditions.

The farmers in the region accepted the technology because they could see that it can help solve water woes. Read on from **page 1246** in this issue.

### TB and Social Networks

Tuberculosis usually spreads from person to person through close social contacts. So the social network theory and metrics can be applied to understand the spread of TB.

Karikalan Nagarajan from the National Institute for Research in Tuberculosis and Bagavan Das from the SRM University searched for literature using Google Scholar, PubMed and Embase to extract details of studies that applied social network metrics and sociograms to explain TB transmission. They identified 21 relevant publications between 2000 and 2017. They extracted information from 18 studies which met the inclusion criteria.

The researchers say that the study designs in the included publications were so varied that meta-analysis was not possible. So they provide a narrative review that summarises various aspects of the studies including study designs, sample sizes, study populations, settings, network analysis software packages used and social network metrics relevant to understand and predict TB transmission.

The researchers find that the social network approach is useful to identify key network members who transmit infections, susceptible and infected contacts and 'hot spots' of TB transmission. They highlight that the social network approach has not been used in countries such as India with high population and high TB burden See the Review Article that calls for filling this lacuna on **page 1068**.

### Imaging Spectroscopy

Using the continuous spectral bands in different electromagnetic wavelength regions, it is possible to detect and quantify the physical and compositional attributes of an object. In late 2015 and early 2016, ISRO's B-200 aircraft covered an area of 22,840 kilometres in the Indian subtropics and used NASA's AVIRIS-NG imaging spectrometer for this purpose.

In a Special Section on **page 1081–1200** in this issue, 12 Research Articles cover various outcomes of this exploratory study, to demonstrate the use of hyperspectral imaging in agriculture, forestry, geology, coastal–ocean, river water, land use patterns and snow cover. This Phase-1 airborne campaign was able to discriminate crops in mixed agriculture, horticultural orchards, forest species, and to assess their abundance and health. It was also able to identify and map medicinally important coral macrophytes, new rock and mineral types, water vapour, and aerosol loading parameters.

The special section also provides insights into calibration and validation, data processing and retrieval algorithms.

The next step would be to build a spectral library with spectro-chemical characterization and to develop analysis tools. The data available now will then serve as a reference or baseline for future spaceborne hyperspectral missions, say the researchers.

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